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TO: MR. DAVID COZAD
ASSO. REGIONAL COUNSEL
U.S. EPA

FROM: Jeffrey L. Zelms
(314) 453-7140

DATE: 12/18/01

Telefaxed By: Laura L. Shaw
(314) 453-7142 ls

Corporate Headquarters: Suite 300, 1801 Park 270 Drive
St. Louis, MO 63146

COMMENTS:

TCS-JLZ.DOC

THE
DOE RUN
COMPANY

SUITE 300
1801 PARK 270 DRIVE
ST. LOUIS, MO 63146
FAX 314-453-7198

JEFFREY L. ZELMS
VICE CHAIRMAN, PRESIDENT
AND CHIEF EXECUTIVE OFFICER
314-453-7140
jzelms@doerun.com

December 18, 2001

Via Telefax & Federal Express Overnight
(913) 551-7925

Mr. David Cozad
Associate Regional Counsel
U.S. Environmental Protection Agency
Region VII
901 North 5th Street
Kansas City, Kansas 66101

Dear Mr. Cozad:

This is in response to the letter to the Doe Run Resources Corporation ("Doe Run") dated December 14, 2001 from Mr. Michael Sanderson ("EPA Letter"). In this letter Mr. Sanderson indicates that EPA Region VII believes that there is a need to amend the current Administrative Order on Consent entered into in May 2001 ("May 2001 AOC") in three respects: Soil remediation; house dust sampling and remediation; and transportation and material handling. He advised that Doe Run should provide its response directly to you. In making our response, Doe Run wishes to first address the latter two areas.

I. House Dust

In regard to house dust, EPA in its letter has asked Doe Run to sample and, if necessary, clean every home where residential yard soil replacement is performed. Doe Run will agree to address house dust in every home where soil is remediated. Doe Run does suggest a modification of the requirement so that Doe Run will clean every home where yard soil replacement is performed, without any need for sampling. Sampling just interposes another step and expense. Previous extensive house dust testing in Herculaneum and other communities indicates that one would expect house dust lead levels to be > 168 ppm. In fact, in Festus, selected because all parties in the study agreed that this city would not have any impacts from the smelter, showed an

average house dust lead level of 780 ppm. Of course, Doe Run would continue its previous commitment to provide HEPA vacuums to all residents within approximately .6 mile of the facility.

One clarification that is needed is that the "WORK TO BE PERFORMED" as currently drafted ("WORK") requires an "Interior Dust Cleanup Plan" but is vague in several respects regarding what EPA will require. Doe Run requires more certainty in this regard and suggests that a more detailed "Post Soil Abatement Dust Cleanup Procedures" be made part of the WORK. Doe Run's suggested interior dust cleanup procedures are included as an attachment to this letter.

II. Transportation and Materials Handling

In regard to transportation and materials handling, Doe Run believes that EPA is incorrect when it states that there are no enforceable procedures in place addressing ore concentrate handling and transportation activities. The lead SIP which was made a part of the May 2001 AOC specifically addresses "road dust controls" and imposes requirements in a Work Practice Manual, one portion of which specifically addresses fugitive emissions from identified paved and unpaved portions of the plant, from sinter cars, and from "concentrate storage piles". Nevertheless, Doe Run would be agreeable to provide to EPA a "Smelter Transportation and Materials Handling Plan".

However, the language of EPA's proposed "Work to be Performed" ("Work") must be changed to reflect that the plan will "minimize" not "eliminate" the release of lead. As EPA is clearly aware from its own extensive work on emission factors for materials handling, there cannot be zero emissions from such activities. While measurable, such emissions are still an insignificant portion of total lead emissions from the facility. The detailed "Doe Run Lead Emissions Inventory, Herculaneum Smelter" from June 2000 (provided during the lead SIP approval process) indicated that the amounts of "outside fugitives" only contribute 1.4% of the total lead emissions from the facility. Also the Chemical Mass Balance Receptor Modeling (also provided during the lead SIP approval process) indicated that, at what was the only monitoring station not measuring compliance with the NAAQS for lead, the total contribution by lead concentrate and road dust were only 0.83% and 1.56%, respectively.

Nevertheless, Doe Run will agree to submit such a plan. However, in doing so we must also insist that the plan be flexible regarding modes of transportation. While Doe Run is committed to reducing truck traffic through the City of Herculaneum and has just arranged for train transportation of lead concentrates from its Missouri mines, the agreement with the railroad is only for a set period of time and might not be renewed by the railroad or the railroad may close certain of is lines which could affect transportation to Herculaneum. These factors, together with other contingencies, including washed out railroad bridges and railroad strikes reflect the fact that shipment by truck must always be an option. Of course in such circumstances, all shipments would be in compliance with the U.S. Department of Transportation Hazardous Materials regulations.

III. Soil Remediation

The key provisions in the EPA Letter concern accelerated soil cleanup schedules for five categories. With receipt yesterday of the map referred to in the letter, Doe Run has been able to generally understand what work it is being asked to do, even though there will be a need to clarify. For example, there is a question whether all the houses noted as having children actually have children living there. Doe Run will address all five categories listed by EPA, but first would like to request some confirmations and clarifications regarding the soil cleanup generally.

First, when requiring remediation of "homes", "parks", and "playgrounds" we understand that this does not include vacant lots. Doe Run owns a number of vacant lots near the smelter which may be incorporated into either the proposed "greenbelt" adjacent to the slag storage area or a new smelter fence line now possible with the vacation of Main and Station Streets. Second, when a particular category has a cleanup criteria (e.g., 2,500 ppm lead), Doe Run may, at its option, remediate those portions of the site that require cleanup. After reviewing the sampling data, it is clear that there are significant differences among the four quadrants of residences. For example, for virtually all of the residences with some measured soil lead level greater than 2,500 that are along the haul roads, the back yards sample lower than the cleanup criteria.

Doe Run would also ask for a clarification about the current May 2001 AOC. In this AOC, EPA allowed Doe Run to hold in abeyance remediation at those houses which Doe Run owns near the smelter property. These homes do not have any children and, more importantly, could be subject to potential demolition. Under the commitment given to the Herculaneum community to create a "greenbelt" adjacent to the slag storage, Doe Run currently plans to demolish a number of homes it currently owns. Also, with the City of Herculaneum vacating Main and Station Streets, the smelter fence line may be moved and a number of properties currently owned by Doe Run may be incorporated into the smelter facility. Consequently, decisions to remediate these houses should be postponed in the new Order as well. If EPA is concerned about any adult populations living at these properties, Doe Run would be willing to offer additional protections, including house cleaning.

Assuming our understandings are correct, Doe Run is willing unconditionally to accelerate as requested the soil cleanup for the following categories: (1) Homes with children at or under 72 months old with blood lead level in excess of 10 ug/dl and soil lead level exceeding 400 ppm; (2) Child care providers with soil lead levels exceeding 400 ppm lead; and (3) Homes, parks, playgrounds, and elementary schools with soil lead exceeding 10,000 ppm.

Doe Run, through its prior commitment in the May 2001 AOC, will address a significant portion of the homes contained in the remaining two categories. While "Homes with resident children at or under 72 months old" is not a current AOC category,

Doe Run will commit to prioritizing the soil remediation work within .4 mile of the smelter so that homes in this category are done first which will result in such remediation taking place within 4 months of this Order. Further, Doe Run has committed to addressing within one year all soils greater than 5,000 ppm lead. This commitment, together with the current AOC requirement to address within the next twelve months soils within .4 mile represent a significant portion of the total number of homes in the greater than 2,500 ppm soil lead level category.

Despite Doe Run's present commitment to address the above portions of these two categories, Doe Run doe not believe that the remaining requested cleanups are time-critical. Nevertheless, Doe Run is offering the following proposals.

A. <u>All Soils > 2,500 ppm</u>

As stated above, Doe Run has already agreed to address a majority of this category--those yards or portions of yards which are within .4 mile of the facility and, therefore, due to be remediated under the May 2001 AOC within the next twelve months and those yards or portions of yards which are beyond the .4 mile and measure greater than 5,000 ppm. The rest of the homes which would be beyond the .4 mile and would be between 2,500 and 5,000 we believe are simply not time-critical. The conclusion that the homes beyond the .4 mile have much lower levels of contamination than in the zone closer to the smelter, is reflected in the fact that, whereas the portion of residential areas greater than 2,500 ppm in the .4 mile area is 25%, the portion of residential areas greater than 2,500 ppm beyond the .4 mile area is only 5%.

B. <u>Residences with Children with Soils > 400 ppm</u>

Doe Run believes that just because there is a residence with a child at or under 72 months with soils greater than 400 ppm, there is no basis for a time critical action. First, none of these children have elevated blood leads (otherwise Doe Run would have already remediated their residence). Second, Doe Run can find no example in the many Superfund actions it has researched where EPA has previously ordered a time critical action triggered if soils were only greater than 400 ppm. Third, the safe level when finally determined for such residences is likely to be much greater than 400 ppm. The EPA decisions at Jasper County, Missouri and the recent decision at the smelter site at Palmerton, Pennsylvania with cleanup levels at 800 ppm and 950 ppm (the Jasper site actually allowed 1500 ppm lead in soil where is phosphate amendment) clearly indicate that a safe level can be much higher than 400 ppm. This is especially true, given the extensive studies concerning the efficacy of phosphate amendment and the fact that safe lead levels could be twice what a remediation number might be absent any soil amendment. Fourth, remediating low levels of soil lead now does not make sense when the major lead SIP projects will not be concluded for six more months. Attached is a brief explanation together with references of why Doe Run believes such accelerated cleanup is not warranted at this time.

In stating that Doe Run believes that such cleanup is not time critical, Doe Run is, however, willing to consider conducting certain actions to provide extra security that the children in such homes will not be placed at any significant risk. Doe Run is willing to commit to a program of cleaning of all homes with children at or under 72 months. As described more fully in our attached explanation, we believe that available studies show that house cleaning is much more effective than soil removal in removing risks from children. This is especially true where levels are in the lower ranges of soil lead levels such a those found beyond the .4 mile. Also, Doe Run would be willing to conduct phosphate soil amendment at such homes if EPA believed that additional protection was warranted. Given the information derived from Missouri soils in Jasper County, it is clear that simple phosphate amendment could double allowable lead levels in soil. These commitments should give EPA additional confidence that the children remaining in such homes are not facing any unreasonable risks. With these commitments, Doe Run believes that the children of Herculaneum will be protected, even if the final remediation of soils is held in abeyance pending completion of the risk assessment EPA required in the May 2001 AOC.

C. Doe Run's Proposals Regarding Soil Remediation

While Doe Run believes that it has raised serious questions regarding whether the portions of cleanups in the two categories discussed above warrant accelerated schedules and will provide to EPA further documentation of these points, Doe Run desires to ultimately achieve complete cleanup of the area and would consider agreeing to such actions under certain conditions. However, as discussed in our meeting in Kansas City on December 7, 2001, Doe Run's financial situation at present is such that we may not be able to fund all the accelerated work presently requested by EPA.

Nevertheless, there may be some ways in which Doe Run could undertake all that EPA is asking in its letter. If non-time critical costs currently committed to by Doe Run to EPA Region VII were to be rescheduled, it may be possible for Doe Run with its available finances to conduct all the accelerated cleanup enumerated by EPA. Some examples of rescheduling include postponing certain studies currently required under the May 2001 AOC (with much of the cleanup completed within the year, certain efforts regarding risk assessments may be shortened or eliminated). Other requirements might be changed.

Another consideration which would help significantly to enable Doe Run to conduct all of the accelerated work, is that EPA Region VII could exercise its discretion to either forgive or reschedule its oversight charges. In addition to the work being conducted at Herculaneum, Region VII currently administers an additional nine AOCs involving Doe Run. The total oversight costs for EPA for the next year could enable Doe Run to fund a substantial portion of the accelerated cleanup proposed by EPA. Being that a considerable portion of such oversight costs are already embedded EPA costs (e.g. salaries) or apportioned Headquarter costs which are already appropriated and paid, it should not cause any fiscal difficulties for EPA Region VII to either waiver or reschedule such oversight costs.

If, after further discussions, EPA does not believe that it can reschedule or waive current obligations of Doe Run so that we would financially be able to perform all the requested activities, then Doe Run requests that EPA consider doing the two portions of additional work which EPA still considers time-critical and allowing Doe Run to reimburse EPA over time.

Please advise as soon as possible if an agreement may be reached concerning Doe Run's conducting these actions. To speed up the process, Doe Run is including both a more fully developed rationale as to why it believes certain actions are not really time critical and a redlined version of the "WORK" noting certain requested changes should EPA decide that Doe Run may proceed. We anticipate your response and would suggest a face to face meeting in Kansas City to negotiate final terms for an agreement in this matter. Please advise when you wish to meet with Doe Run so we may make appropriate travel arrangements.

Sincerely,

Jeffrey L. Zelms

JLZ/lls
33-1038

DRAFT 12/18/01

WORK TO BE PERFORMED

1. For the residences at which Doe Run recently conducted soil sampling pursuant to the Additional Work provision of the Administrative Order on Consent, Docket No. RCRA-7-2000-0018 and CERCLA-7-2000-0029 ("May 2001 Order"), and which fall into one of the categories listed below, the cleanup schedule is as follows:

Category	Time frame for soil replacement
Homes with children at or under 72 months old with blood level in excess of 10 ug/dl and soil lead exceeding 400 ppm	Within 30 days of being notified by EPA of location of residence
Child care providers with soil lead levels exceeding 400 ppm lead	Within 30 days of being notified by EPA of location
Homes with resident children at or under 72 months old and soil lead exceeding 400 ppm	Within 4 months of effective date of this Order
Homes, parks, playgrounds, and elementary schools with soil lead level exceeding 10,000 ppm	Within 6 months of effective date of this Order
Homes, parks, playgrounds, and schools with soil lead levels between 2,500 ppm lead and 10,000 ppm lead	Within 12 months of effective date of this Order

2. EPA and Doe Run acknowledge and agree that with respect to the properties which fall into one of the categories listed above in Paragraph 1, the cleanup schedule set forth in Paragraph 1 herein requires a more expedited cleanup schedule than the schedule contained in the May 2001 Order. EPA and Doe Run acknowledge and agree that the schedule in Paragraph 1 herein replaces and supersedes the schedule contained in the May 2001 Order, and that compliance with the cleanup schedule contained in Paragraph 1 herein will constitute compliance with the cleanup schedule contained in the May 2001 Order.

3. All soil cleanup work performed by Doe Run pursuant to this Order shall be performed in accordance with the Community Soil Cleanup Plan as approved by EPA pursuant to the May 2001 Order. [Soil cleanup work under this Order shall not include vacant lots. Soil cleanup work under this Order may include portions of homes, parks, playgrounds, and schools such that all remaining soils meet the cleanup criteria.]

4. This Order only changes the cleanup schedule for properties with fall into one of the categories listed above in Paragraph 1. With respect to properties where soil has not yet been sampled or where soil has been sampled and the property is not in one of the categories listed in Paragraph 1 herein, the schedule for characterization and cleanup contained in the May 2001 Order remains in effect.

~~5. Doe Run shall characterize interior dust contamination at all residences where soil characterization sampling has been or is in the future conducted pursuant to the May 2001 Order. At each residence where Doe Run performs soil excavation and replacement pursuant to the May 2001 Consent Order, Doe Run shall perform interior dust characterization sampling with 15 days of the completion of yard soil replacement. For yards where Doe Run has completed soil excavation and removal since September 1, 2001, but prior to EPA's approval of the Interior Lead Dust Sampling and Analysis Plan, Doe Run shall perform interior dust characterization sampling with 30 days of EPA's approval of the plan. Doe Run shall develop a comprehensive Interior Lead Dust Sampling and Analysis Plan and submit it to EPA for review and approval within 15 days of the effective date of this Order. All interior dust sampling and analysis shall be conducted in accordance with the approved Interior Lead Dust Sampling and Analysis Plan. This plan shall describe in detail the sampling methods to be utilized, locations to~~

~~be sampled, and the numbers of samples to be collected at each residence. Interior lead dust characterization sampling shall be conducted using the ASTM D5438-93 Method or modified version of this sampling method such as the Baltimore Repair and Maintenance Method. Analytical results from interior dust characterization sampling shall be provided to the owner of the property and to EPA within 20 days of performance of the sampling.~~

~~6~~[5]. Doe Run shall perform an interior dust lead cleanup at all residences where ~~the interior lead dust sampling required pursuant to Paragraph 5 herein shows that dust lead levels exceed 168 parts per million~~ [yard soil replacement has been performed]. Interior cleanup shall be initiated within 20 days of ~~transmittal of interior dust sampling results to a residence~~ [completion of yard soil replacement]. Doe Run shall work with each residence requiring indoor dust cleanup to schedule the indoor dust cleanup at a time which minimizes inconvenience for the resident. Doe Run shall develop an Interior Dust Cleanup Plan and submit it to EPA and MDNR for review and approval within 30 days of the effective date of this Order. The plan should include, but not be limited to, a detailed description of worker qualifications and credentials; cleaning equipment and methods; plans and procedures for addressing different areas within residences, such as walls, floors, carpets, attics, furniture, draperies, and ductwork; the potential for recontamination of home interiors; and cleanup confirmation sampling in accordance with Subpart D of 40 CFR Part 745. [The Interior Dust Cleanup Plan shall incorporate the general requirements contained in the attached "Post Soil Abatement House Dust Cleanup Procedures".] An interior dust cleanup shall not be considered complete until indoor dust concentration wipe sample results confirm that lead dust concentrations on floors are below 40 micrograms per square foot and lead dust concentrations on interior

window sills are below 250 micrograms per square foot. For each residence where Doe Run performs interior dust cleanup, Doe Run shall provide cleanup confirmation sampling results to the residence, EPA, and MDNR within 20 days of completion of the interior dust cleanup. [In conjunction with the confirmation sampling Doe Run shall conduct a lead source survey.]

~~7~~[6]. Within 30 days of the effective date of this Order, Doe Run shall submit to EPA for review and approval a Smelter Transportation and Materials Handling Plan. Such plan shall describe and explain in detail practices and procedures which Doe Run will implement and follow to ~~eliminate~~ [minimize] the release of lead to the community as a result of Doe Run's transportation and materials handling activities. The plan shall address practices to ~~eliminate~~ [minimize] the release of lead from vehicles transporting materials to the Doe Run smelter, from vehicles unloading activities, from vehicles leaving the facility, and any other activities related to materials handling and transportation which may result in release of lead. The plan shall also include an expeditious schedule for implementation. Upon approval of the Smelter Transportation and Materials Handling Plan, Doe Run shall implement the plan, as approved.

Post soil abatement house dust cleanup Proceedures

Lead trained cleaning crew under modified site-specific lead abatement training program by Doe Run's Hygienist. Employees following general lead worker rules, such as leave at work clothing, shower at end of shift, eat in clean cafeteria or change building, no smoking on job etc.

Use HEPA filter vacuums for all carpeted surfaces and upholstered furniture. Wet mop all hard-surfaced floors three times with tri-sodium phosphate rinsing each time with clean water. Clean windows, windowsills, and window wells with tri-sodium phosphate solution. Wipe down walls in children's rooms and play areas with tri-sodium phosphate solution. Basement cleaning will be limited to vacuuming unless there are finished rooms in which case the procedures outlined above will be followed.

Attics will be addressed only if they are accessible to young children on a regular unsupervised basis and have been turned into an additional room with a floor, walls, etc. In this case they will be treated like a main floor room.

Change air filter and provide package for 4 changes subsequently. Provide plastic trash bags for disposal in regular trash according to Missouri DNR's lead remediation household solid waste circular.

Within a short time (a few days) after cleaning a sampling crew comes in to verify that floor and windowsill standards have been met. They will also test surfaces for presence of Lead Based Paint and do a visual condition check.

If any of the clearance tests come back negative, the cleaning crew will return to reclean those areas not passing.

SCIENTIFIC RATIONALE SUPPORTING THE ISSUES INVOLVING THE DRAFT "WORK TO BE PERFORMED" STATEMENT

This memorandum is submitted as part of the response to EPA's letter of December 14, 2001. The purpose is to explain the science supporting the issues involving the time critical aspects of the "Work to be performed" statement. Specifically, there are four topics addressed: (1) the time critical 400 soil removal level, (2) the football field removal level, (3) the dust intervention issue and its relationship to the soil removal, and one issue from the letter and not the work statement namely (4) the need to accelerate soil testing outside of the one mile zone.

I. The time-critical yard replacement removals at 400 ppm lead that are outlined in the "Work to be Performed" Statement are not justified either (a) by the risks those levels in yards pose or the level of risk reduction that will be made if those yards are replaced, (b) the measured blood lead levels in a portion of the area in which levels from 400 to 2000 removals apply, (c) nor the precedents that EPA has considered time-critical in the past. 2000-2500 ppm is a more reasoned level for time critical for this situation based on the science.

(a) The time-critical yard replacement removals at 400 ppm lead that are outlined in the "Work to be Performed" Statement are not justified by the risks those levels in yards pose or the level of risk reduction that will be made if those yards are replaced.

Blood leads in the United States have been plummeting since the 1940's. There is a consistent downward trend in the entire US population.

ENCLOSED IS A COPY OF THE OECD BLOOD LEAD REDUCTION PAPER

ENCLOSED IS A COPY OF THE 1994 CDC ARTICLE

ENCLOSED IS A COPY OF THE NMWR WEEKLY DEC 22, 2000

This downward trend includes the area around the smelter. This is demonstrated by a graphic in the enclosed Neighbor Notes from September 2000.

ENCLOSED IS A COPY OF NEIGHBOR NOTES SHOWING HERCULANEUM REDUCTIONS

In summary these documents demonstrate that blood leads in the 1940's averaged in the mid 30's to 40's for the total population including all racial groups and those living in all ages of housing. They have now fallen below 5 for the general population. However, the level depends on the age of housing as shown in the second report from CDC. There is a seven point differential between blood leads of those living in housing newer than 1978 and those living in housing older than 1950. The national data is reflected in Herculaneum where those living in pre 1950 housing have an 8 blood lead average, right

at the national average for that age housing. This should have been factored into EPA assessment of risk and apparently was not.

GRAPHIC ON AGE OF HOUSING FROM HERCULANEUM/NHANES DATA

ENCLOSED MAP OF AGE OF HOUSING IN HERCULANEUM

In general, the distribution of lead levels in Herculaneum in residential soils is much higher near the smelter than further away. Table 1 of the enclosed article shows the pattern as represented by a study in 1984. The database was collected under the Project Management of the State of Missouri Department of Health and the principal co-authored a peer-reviewed article on the results.

The surface soils from that cross sectional study of houses where young children resided showed average values within the 0.5 miles of the smelter at about 1900 ppm Pb. At ½ to 1 mile the average value was about 650 ppm Pb and beyond 1 mile and less than a mile and 1/2 the average value was 150 ppm Pb. The control community in Festus had soil leads of 110 ppm Pb.

COPY OF HERCULANEUM ARTICLE BY PHILLIPS ET AL ENCLOSED.

This pattern has been borne out by the 2001 sampling recently completed by Doe Run under agreement with EPA conducted by REACT Engineers. The raw data is enclosed.

COPY OF RAW DATA ENCLOSED FROM REACT ENGINEERS SAMPLING FOR RESIDENTIAL SOILS

The median value in the northern sections of the sample area between 0.4 miles and about 1 mile is in fact right at 800 ppm consistent with the findings of the 1984 study. While it is known that there is a recontamination concern near the smelter, it would not be expected that there would be any substantial increase in soil leads in the last 10 years in the area between 0.4-1 mile, as only a small fraction of the emissions of the plant have occurred during that period of the plant's history due to the reductions in emissions in modern times. In fact, that area 0.5-1.0 miles and beyond have been in attainment with the air lead standard for a significant portion of the last 5 years.

An examination of the data shows that the amount of residential property contaminated above 2500 ppm lead is limited to about 5% of the area beyond 0.4 mile from the plant stack. See enclosed data and associated map.

The soil lead pattern inside of 0.4 mile is skewed by the soil replacement pattern over the last decade but the remnants on properties owned by Doe Run reflect the pre-removal levels.

MAP OF HIGH SOIL LEADS OUTSIDE OF 0.4 OF A MILE.

The area further out from the plant has relatively low dust levels in housing. We have included the raw dust data collected by EPA. Even the haul road dust data shows relatively low levels of lead dust in the house relative to the windowsill clearance level standard of 250 ug Pb/sqft. While this data was collected by non-traditional means the areas further out are, from a comparative standpoint, very low. There is almost no EPA dust data available in the newer subdivisions where the question under consideration is relevant because apparently, few of the houses there triggered the EPA criteria used for sampling.

RAW DUST DATA COLLECTED BY EPA IN HERCULANEUM

MAP OF HIGH LEAD DUST DISTRIBUTION IN HERCULANEUM

In the 1984 data set, the concentration of lead dust inside the house was 630 ppm. The soil lead was 150 ppm. Given that the IEUBK model attributes 70% of the lead mass from outside the house, only 105 ppm lead can be explained by the yard lead. The rest of the 630 ppm is explained by lead from inside the house. If EPA considers these levels excessive then they cannot lay the source to the smelter. The control community of Festus had levels just as high. Again, risk must be assessed sector by sector accounting for the variability of the key factors in order to assign risk.

USEPA under a $ 15 M appropriation studied soil replacement effects on blood leads in Baltimore, Cincinnati, and Boston. There was no effect of soil replacement in Baltimore and Cincinnati for soil leads in the 500 or so ppm lead level. In Boston, where the soil leads were higher because of preponderance of frame housing, soil lead removal was not found to be effective except when done in conjunction with lead based paint stabilization in the house. Dr. Kenny Crump, a member of EPA's Scientific Advisory Board, critiqued the Three Cities Study. A copy of that document is enclosed. His paper confirms that the Cincinnati and Baltimore studies do not show any effect of soil removal, but also shows that there is no case made in Boston for blood lead reductions below about 2000-2500 ppm. Also, the Boston evidence has to be used cautiously, so that it may only apply to children with higher blood leads. However, in looking for a time critical value this may be appropriate.

ENCLOSED IS A COPY OF KENNY CRUMP CRITIQUE OF THREE CITIES STUDY

Dr. Rufus Cheney, from the US Department of Agriculture, in his discussion on bioavailability of lead reinforces the point about the risk from low soil lead levels. He is one of the leading government scientists with an expertise in this area. The graph from his paper is reproduced here. His data show that there is a threshold below which there is low or minimal effect of the uptake of lead. He also shows that bioavailability is low at lower lead levels in soil in the range that is suggested for cleanup.

ENCLOSED IS A COPY OF THE ARTICLE FROM THE SEGH CONFERENCE BY CHENEY.

As telling is a Toronto post remediation study, which follows blood lead levels after replacement of soils in Toronto. A matched control group with no soil lead replacement is also followed. Both the soil replacement cohort and the control group blood lead levels fell, the control group actually falling more than the soil replacement group.

SEE PAPER ENCLOSED IS AED ON TORONTO

These studies taken as a whole do not support any short term (time critical) improvements in blood lead levels from soil cleanups at these levels below 2000-2500 ppm. Given this body of data, there is no reason to expect any measurable blood lead reduction from replacing soil at the lead levels discussed in the draft work order. We are aware that the IEUBK modeling and risk assessment may well without site specific data predict that soils should be replaced as a conservative risk reduction measure in the long term, but the key EPA and North American studies we reviewed, do not demonstrate a reduction of blood lead levels following remediation. Since blood leads are falling all over North America, there is of course evidence of blood leads being reduced around lead mining and smelting sites, but not faster than a relevant cohort. In Boston, the data cannot be disaggregated from the paint lead stabilization work and therefore is not useful to answering the question as amply discussed by Crump.

One final point needs to be made concerning the haul roads. This risk for yard soil for houses along the haul roads needs to be assessed separately. Because of the practice of salting these two main roads with blast furnace slag years ago, for skid protection in the winter, it appears that the predominant reason for the high lead levels along the haul roads is the historic deposit of slag. A sample collected by Jim Lanzafame of Doe Run and analyzed shows an undisputable chemical fingerprint of lead blast furnace slag.

ENCLOSED IS AED IS A MEMO SHOWING THE CHEMISTRY OF A SAMPLE

While I have not seen and do not believe that we have the data, I was informed by Dave Mosby in a conference call on which Tony Petruska and Gene Gunn were online, that the lead to zinc ratios on samples that they took along the haul road were 5 to 1, whereas slag ratios should be 1 lead to 5 zinc just the opposite. We agree with that slag has a 1 to 5 lead to zinc ratio. However, if the material were lead concentrate, it would be 75 lead to 1 zinc, which is the ratio of lead to zinc in lead concentrate. Mathematically, if you had a blend 3 parts of lead blast furnace slag and one part of lead concentrate, the ratio would be very close to 5 parts lead to one part zinc, the value that was reported in the phone conference.

Slag has an extremely low bioavailability. A sample of slag was submitted to the University of Colorado recently for in vitro bio-availability analysis. The results show that it is only 0.2 % relative bioavailability. This means that 50,000 ppm lead slag sample would present the same risk as a 100 ppm lead in soil sample (near the Festus background sample of 110 ppm) clearly not a level that would be considered time-critical. The value for concentrate is 1.2% relative bioavailability. As one possible

example, if this material along the haul roads turned out to be the 3:1 slag to concentrate mixture, the risk would be equivalent to a soil with 225 ppm lead, a level also below the proposed 400 level.

ENCLOSED IS A UNIVERSITY OF COLORADO REPORT ON BIOAVAILABILITY

There has been a concern expressed that the concentrate may eventually oxidize. Slag does not oxidize, because the lead is in the form of a tightly bound silicate. The rate of oxidation of concentrate is sufficiently slow, that we do not believe it to be a time critical concern.

Finally, there has been some discussion that the recent ATSDR report in Herculaneum definitively shows the source of lead in House Number 1 with the 2 year and 4 year old comes exclusively from the smelter. The report is flawed in ways that we will discuss. We do not have the same level of detailed information concerning House Number 2.

ENCLOSED IS A ATSDR REPORT ON ISOTOPIC RATIO ANALYSIS

It is important to understand the sources of lead dust in homes in Herculaneum. If the source of a significant portion of the dust is from inside the home, the strategy of cleaning up soil lead significantly overestimates the amount of impact it has. Our reading of the science is that this is the case in those sectors of town with very old housing.

The premise for this study is that the isotopic ratio of lead isotopes has an exact signature for lead from a particular mining district, due to its geologic age and formation. It well known that the signature of lead from the Idaho mining district, which is in a volcanic host, is different from that in Missouri, which is in a sedimentary host rock. Likewise, the Australian lead deposits differ from the Idaho and Missouri deposits. In addition, the ratio of ore mined in Missouri 75 or 100 years ago should be identical to ore mined recently, because the ratio of these stabile isotopes will not change during this relatively brief period in geologic time.

However, if you look at the ratios in Figure 1 of the study you can see that there is a significant difference in the ratios of air 1 and air 2 from the samples HS1 and HS 2. They are approximately as different from the paint sample and the child's blood lead as the paint sample is from the child's blood lead. In the first place the air samples from the stack and those taken at the house should be exactly the same since, they are theoretically from the same source, Doe Run's lead emissions. If nonetheless, they were different, then the more proximate values, those from air 1 and air 2 are as different from the child's blood lead as the paint sample is from the child's blood lead. This relationship could be explained if half of the contribution to the child's blood lead came from the air sample, and half of the contribution came from the paint sample. That would be a much better explanation than that presented by the author.

It is also disturbing that only one paint sample was collected at each house. When the Missouri Department of Health (now Health and Senior Services) followed up on the

elevated blood lead children in House Number 1, it looked for lead paint and found 8 different locations with accessible surfaces determined to be high enough to be classified as lead based paint (LBP), including some of them in the children's bedrooms. Since this house, which is 80 years of age, must have been painted in whole or in part many times over the decades, a single paint sample may or may not be representative of the numerous coats of paint and types of paint placed by the various owners. One would expect that most of the early paint would have come from Missouri and made from Missouri lead and therefore had the same isotopic ratio signature that the current smelter materials have. The fact that the ratio in House Number 1 was 19.35 and House Number 2 was 20.89 should point out this fatal flaw in the study design, whose main purpose was to differentiate lead based paint from lead from the smelter. This difference in numbers is much wider than any other differences discussed and analyzed in the report.

ENCLOSED IS DATA FOR HOUSE NUMBER 1 FROM MO DOH

Another possibility is that there are multiple coats of paint from various sources over the years and there is not one signature for the lead in the paint. The child could be getting lead from multiple pathways that include lead dust from the smelter and lead paint from more than one mining district.

The isotopic ratio for soil, for dust, and for air should in fact all be identical if the premise for this study is valid.

The same pattern occurs form the 2 year-old girl from house number 1 as shown in Figure 2. In addition, the Hand Wipe sample HW1, the suggested pathway, is shown to be very similar to the paint sample. So it is possible that the child's exposure that particular day was from paint dust.

The report on page 6 says "It is possible that another unidentified source of lead is contributing to the elevated blood lead levels in these children. The Lead isotope ratios in many of the air, soil, and house dust samples slightly exceeded the lead isotope ratios in the blood samples. Therefore, it is possible that another unidentified lead source, particularly one with a lead isotope ratio lower that those in children's bloods, is contributing to their lead exposure. However, the comprehensive environmental screening conducted during the EI and detailed interviews with the families failed to identify other potential sources of lead exposure."

While the technique used in the study can be very powerful, the sample results are very inconsistent with the premise of the technique. Given a balanced interpretation of the findings of this report, they should have found the results inconclusive. The investigators could have resolved this issue by going back to the house for more paint samples and to reproduce the other sample signatures. They also should have investigated the unsupportable finding that the signatures on the various environmental samples from the smelter had significant variability. In short, there are many explanations to the data collected by this team of professionals and more work should have been done before

jumping at a conclusion which is in fact inconsistent with what is generally known about the contribution of lead from older housing.

A study with a similar objective was conducted in St. Francois County by faculty of the St. Louis University School of Public Health using Scanning Electron Microscopy X-ray diffraction technology entitled "Source Contribution of Lead in House Dust From a Lead Mining Waste Superfund Site".

"The relative contribution to household dust of lead particles from a mining waste superfund site and lead-based paint is investigated. Automated individual particle analysis (IPA) based on scanning electron microsopy (SEM) and W-ray energy spectroscopy (EXD) is used to develop a classification algorithm for determining lead particle source contribution in household dust vacuum bags. .... Using a weighting method accounting for the lead concentration per particle rather than volume the contributions were similar for mining waste and paint, 21% and 23% respectively, but the soil contribution was reduced to 8% and the source for 29% could not be identified."

ENCLOSED IS A COPY OF ST. LOUIS U PAPER

This is typical of what would be expected for a site with a mixed source of old housing and contamination from a lead processing facility. Children in old housing with lead based paint will have such a contribution whether they live near a lead processing facility or not.

b) The time-critical yard replacement removals at 400 ppm Lead that are outlined in the "Work to be Performed" Statement are not justified by the precedents that EPA has considered time critical in the past. 2000 ppm is a more reasoned level for time critical for this situation.

EPA's precedents vary concerning interim action time critical removal of yards, but the most relevant decision in Region VII is in St. Francois County. The criteria for intervention are: (1) any yard with an average yard soil lead concentration of greater than 2,000 ppm. (2) Any yard with a child in residence with a blood lead greater than 15 ug/dl and an average soil lead concentration of greater than 400 ppm, or (3) Any yard with a child in residence with a blood lead greater than 10 ug/dl after three quarters of blood lead screening and an average soil lead concentration of greater than 400 ppm. If a residential yard soil meets one or more of the criteria listed above, then all areas of the yard with a soil lead concentration greater than 400 ppm will be excavated to a depth of 12 inches and replaced with clean fill. There is also a hot spot criterion, which might be applicable to areas like the strip along the haul road.

St. Francois County had a number of smelters and calciners inter-twined among the mining operations during its history, the mineralogy of the ore is the same of course and there is also a history of transportation of materials so there are many similarities in the two areas.

ENCLOSED IS A COPY OF THE INTERIM ACTION PLAN FOR ST. FRANCOIS COUNTY.

c) The time-critical yard replacement removals at 400 ppm lead that are outlined in the "Work to be Performed" Statement are not justified by the measured blood lead levels in a portion of the area in which the removals apply.

The area outside of about 0.6 of a mile from the smelter is an area where the August 2000 blood lead survey showed no elevated blood leads above 10 ug/dl. We became aware of one child at exactly the 10 ug/dl blood lead, but the child was in childcare right across from the plant. Since then, both the residence and the childcare facility have been remediated. We are not yet privy to the results of the recent blood lead studies conducted by the health agencies. We understand that there may be two elevations outside of the zone of 0.6 miles from the smelter stack. However, it appears that the 95% criteria for low risk is being met in the area outside of 0.6 miles from the smelter as reflected in the blood leads. While there may yet be a predicted risk ultimately based on the IEUBK model, it is premature to come to that conclusion until the risk assessment is done, and the modest levels of actual blood leads argue against a time-critical removal.

BLOOD LEAD REPORT OF AUGUST 2000

MAP OF ELEVATED CHILDREN FROM AUGUST 2000 SURVEY

II. While the science suggest that there is an appropriate dust intervention strategy, part of what is suggested in the "Work to be Performed" Statement should be modified to be more closely tied to the science and what is known.

The Phillips and Vornberg paper suggest that lead dust control from whichever source has five times the potential blood lead reduction than soil lead abatement in the short run. See Table 6. A 50 to 75% reduction in house dust should have a 33-50 % reduction in blood leads. We believe that the science indicates that this is a more effective time critical intervention than early actions on soil lead especially at low levels below 2000-2500 ppm Pb.

Restating a statement from the soil part of these comments. It is important to understand the sources of lead dust in homes in Herculaneum. If the source of a significant portion of the dust is from inside the home, the strategy of replacing soil lead significantly overestimates the amount of blood lead reduction impact it has. Our reading of the science is that this is the case in those sectors of town with very old housing.

The Alliance to End Childhood Lead Poisoning has pointed out correctly that it is impossible to set soil standards independent of the other sources of lead in a Superfund site and has urged EPA to adopt dust standards that are independent of soil lead and to quit setting rigid soil cleanup standards that take resources away from more critical sources.

COPY OF ALLIANCE TO END CHILDHOOD LEAD POISONING LETTER

Battelle Institute conducted a literature review of published papers that could be used to assess the effectiveness of lead intervention programs in homes for paint stabilization, dust removal, education programs, as well as soil lead replacement.

ENCLOSED IS A COPY OF BATTELLE REPORT

This study was done to support the Title X 403b rulemaking conducted by EPA during the last half of the last decade. The report identified a number of such studies. While their summary is vague, if one reads the individual reviews of the studies in their entirety, a dramatic pattern emerges. In a significant number of the education and house cleaning programs, a 15-30 % reduction in blood leads can occur in a 6 to 12 month period based on lead education and individual family intervention.

The outdoor soil contamination level anticipates an indoor dust level that reflects track-in of the outdoor soil level. Around an active smelter there is an incremental dust component from the air lead level that can also be reflected in the model. However, as one gets away from the smelter and the dust lead no longer reflects the influence of the smelter, all of the defaults are more likely to be appropriate. In the case of Herculaneum this condition is met beyond a half mile in every direction. Because of the age of housing in Herculaneum, it is even more appropriate to populate the model with actual data.

The older housing in Herculaneum is distributed nearer to the smelter and along the haul roads. The housing risk factor does not seem to have been taken into account in the modeling work of EPA to determine a dust lead cleanup level (see Indoor House Dust Cleanup Goal for Lead Herculaneum Led Smelter, Mike Beringer to Bruce Morrison, 29 Nov 2001). Because of that, the dust lead levels from the smelter and smelter transportation may both have been over estimated. The haul road houses must be evaluated in a separate class as should different sectors of the community because the impact of different factors are different in each part of the community. These factors include proximity to the smelter, air lead concentration and deposition from the smelter, the haul road activities, the age of housing.

The use of 168 ppm lead for an intervention level is below the background dust level of 780 ppm lead that was measured in the control community of Festus in a matched control community which included a match of housing age and other demographics in the Phillips paper. This community was selected as a match by the Department of health using their demographic bases. Even in areas further from the plant where soil leads are 150 ppm and blood leads are at national averages, the indoor lead concentration is near the Festus level at 630 ppm.

The correct science here is to evaluate Herculaneum as a number of separate sub areas and look at risk in each area separately. EPA and Mo DNR both agreed to do so in the

AOC. It is important to look closely at each sector by age of housing, proximity to haul road, lead speciation in each sector, etc.

More data needs to be developed on the lead paint status of the community. We have proposed a method to collect that data.

The data available for lead contributions from inside the house as well as smelter sources argues that a dust intervention strategy rather than an accelerated yard cleanup strategy should be selected as an interim measure. It appears based on the Phillips paper that it would perhaps three times more effective in reducing blood leads. That would allow the time for a proper risk assessment to be conducted to determine what the correct soil lead cleanup level should be.

III. Public Use Lands also need separate risk assessment based on use, distance from smelter, time of use, dust levels and other information.

Concerning the public land areas, we specifically have one comment. The football field is in a different land use category than other play and recreation areas on the Dunklin R-5 School properties. Doe Run was approached by the school district in 1997 to answer the question concerning risk with regard to the football field. The company commissioned Dames and Moore to conduct a professional risk assessment, relying on EPA and other accepted methodologies. The risk assessment concluded higher numbers than the 2500 ppm in the draft order. This area should be carved out and placed in a different category. To our knowledge the assessment is still valid.

ENCLOSED IS A COPY OF DAMES AND MOORE RISK ASSESSMENT.

IV. The Administrative Order on Consent includes a plan for assessing contamination further out in the community beyond the one mile point. That plan is adequate to address that issue and should not be accelerated based on what is currently known and will probably detract from higher risk activities.

In the August 2000 blood lead study, in the area outside of one mile the blood leads average 3.9 and to our knowledge there was not one single child with a blood lead approaching 10 ug/dl. The AOC has a provision for sampling outside of this area but not until the risk assessment is completed. Nothing has been learned in this most recent study that suggests anything time critical needs to be done. The existing language of the AOC should control.